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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,172	01/30/2002	Ki-Nam Kim	4591-224	2722

7590

07/25/2003

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EXAMINER

TRAN, LONG K

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 07/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/066,172

Applicant(s)

KIM ET AL.

Examiner

Long K. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 21-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

Response to Amendment

1. This office action is in response to amendment filed on May 22, 2003.
2. Claims **1 – 20** have been cancelled in Paper No. **9**.
3. Claims **21** and **22** have been amended in Paper No. **9**.
4. Claims **21 – 24** are presented for examination

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim **21** is rejected under 35 U.S.C. 102(e) as being anticipated by Takatani et al. (US Patent No. 6,396,092).

Regarding claim **21**, Takatani disclose a ferroelectric memory device comprising: a first Interlayer insulating layer 27 (figs. 5-7) formed on a semiconductor substrate 21 (figs. 5-7); a buried contact structure connected to the substrate through a first contact

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hole 32 (figs. 5-7) extending through the first interlayer insulating layer, the buried contact structure formed on the first interlayer insulating layer; a blocking layer 41 (fig. 7) formed on the buried contact structure and the first interlayer insulating layer; a second interlayer insulating layer 51 (figs. 8-10) formed on the blocking layer; and a ferroelectric capacitor including conductive layer 52 that fills a second contact hole and connected to the buried contact structure 32 (figs. 8-10) through a second contact hole 52 that penetrates the second interlayer insulating layer and the blocking layer, the ferroelectric capacitor being formed on the second interlayer insulating layer. *It is noticed that elements 52 and 61 are considered as parts of the capacitor.*

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims **21** and **23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US Patent No. 6,040,596) in view of Ikeda et al. (US Patent No. 5,411,911).

Regarding claim **21**, Choi et al. disclose a memory device comprising: a first interlayer insulating layer 20 (figs. 3A – 4C) formed on a semiconductor substrate 10 (figs. 3A – 4C); a buried contact structure connected to the substrate through a first contact hole 22 (figs. 3A – 4C) extending through the first interlayer insulating layer, the buried contact structure formed on the first interlayer insulating layer; a blocking layer,

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etch stop layer, 30 (figs. 3A – 4C) formed on the buried contact structure and the first interlayer insulating layer (it is noted that, the claim language does not specify the blocking layer touching the buried contact hole); a second interlayer insulating layers 32 (figs. 3A – 4C) formed on the blocking layer; and a capacitor including conductive layer 34 that fills a second contact hole connected to the buried contact structure 22 (figs. 3A – 4C) through a second contact hole that penetrates the second interlayer insulating layer and the blocking layer, the capacitor being formed on the second interlayer insulating layer.

Choi et al. disclose the capacitor's dielectric layer comprising of tantalum-oxide (col. 3, lines 43 – 44). However, Choi et al. do not teach capacitor's dielectric layer formed of ferroelectric material.

It is conventional and also taught by Ikeda et al. (US Patent No. 5,411,911; col. 10, lines 32 – 36) that material such as Ta₂O₅, ferroelectric PZT or BST are commonly used to form the capacitor's dielectric layer in semiconductor device and they are interchangeable. Therefore, it would have been obvious to one of ordinary skill in the art to form capacitor's dielectric of a ferroelectric material instead of Ta₂O₅ in order to make ferroelectric capacitor as claimed invention.

Regarding claim **23**, Choi et al. disclose the diameter of the second contact hole is larger than the diameter of the first contact hole (especially bottom part of first contact hole).

7. Claim **22** is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US Patent No. 6,040,596) in view of Huang (US Patent No. 6,251,726).

Regarding claim **22**, Choi et al. disclose the claimed invention of claim 21. However Choi et al. do not explicitly teach the blocking layer (etch stop layer) comprising silicon oxynitride, silicon nitride, and aluminum oxide.

It is conventional and also taught by Huang (US Patent No. 6,251,726; col. 41 – 42) that material such as silicon oxynitride, silicon nitride, and aluminum oxide are commonly used as etch stop layer material in semiconductor device and they are interchangeable. Therefore, it would have been obvious to one of ordinary skill in the art to form etch stop layer comprising silicon nitride in order to prevent over etching or oxygen diffusion.

8. Claim **24** is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (US Patent No. 6,040,596) in view of Nagata et al. (US Patent Application Publication No. US 2002/0011615).

Regarding claim **24**, Choi et al. disclose the claimed invention except for the buried contact structure is made of tungsten. It is conventional and also taught by Nagata et al. (US Patent Application Publication No. US 2002/0011615; paragraph 0100) that material such as polysilicon or tungsten is commonly used to fill contact plug in semiconductor device and they are interchangeable. Therefore, it would have been obvious to one of ordinary skill in the art to fill contact plugs with tungsten.

Conclusion

9. A shortened statutory period for response to this action is set to expire e (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see MPEP 710.02 (b)).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 703-305-5482. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 703-308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7466 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3329.

Long Tran 

July 17, 2003


HOAI HO
PRIMARY EXAMINER